ABSTRACT

A hydrogen generation apparatus includes controls for delivering a feedstock to a reactor and a water gas step membrane reactor operating at a lower temperature than the reactor so as to efficiently produce purified hydrogen and manage heat within the apparatus. Catalytic combustion of feedstock in the presence of a combustible gas based on a computer controller facilitates operation. Flat plate heat exchangers in various configurations are contemplated as a reactor, water gas step membrane reactor, and purifier. Catalytic burning of feedstock in the presence of a combustible gas enhances apparatus efficiency.